In Defense of IS-LM *

[In a case involving a question of ritual cleanliness], Rabbi Eliezer declared it clean and the Sages declared it unclean... . On that day Rabbi Eliezer brought forth every imaginable argument, but they did not accept them. Said he to them,... "If the *halachah* [religious law] agrees with me, let the walls of this Academy prove it", whereupon the walls inclined to fall. But Rabbi Joshua rebuked them, saying: "When scholars are engaged in a *halachic* dispute, what have ye to interfere?" Hence they did not fall, in honor of Rabbi Joshua, nor did they resume the upright, in honor of Rabbi Eliezer; and they are still standing thus inclined. Again Rabbi Eliezer said to them: "If the *halachah* agrees with me, let it be proved from Heaven!" Whereupon a Heavenly Voice cried out: "Why do ye dispute with Rabbi Eliezer, seeing that in all matters the *halachah* agrees with him!" But Rabbi Joshua arose and exclaimed: "It is not in heaven" [Deut. 30:12]. What did he mean by this? – Said Rabbi Jeremiah: That the Torah had already been given at Mount Sinai; we pay no attention to a Heavenly Voice, because Thou hast long since given the Torah at Mount Sinai (Babylonian *Talmud,* Tractate *Baba Mezia,* 59:b).

The IS-LM diagram was originally developed by Hicks in his classic 1937 paper as an interpretation of Keynes' *General Theory,* and very quickly became the accepted interpretation. In recent years, however, it has come on hard times. Thus it has been criticized by some as a misleading analytical device, as well as an egregious misinterpretation

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The original version of this paper was written while serving as James S. McDonnell Scholar at the World Institute for Development Economics Research, Helsinki. I am indebted to both the James S. McDonnell Foundation and the Institute for their support. In revising it, I have *inter alia* taken account of some of the discussion that followed its presentation at the Conference. The revision itself was carried out while serving as visiting professor at the University of California, Los Angeles during the academic year 1988-89, on which occasion I also benefited from the lively discussion which took place at a seminar at which this paper was presented. In this connection, I am particularly grateful to Seonghwan Oh for pointing out some errors in an earlier draft.

of the book whose essence it was intended to capture. So let me at the outset declare that I have come to praise IS-LM, not to bury it. At the same time, let me add that the critics against whom I have come to defend IS-LM are ones who in some sense continue to regard themselves as Keynesians; I shall not discuss the criticisms voiced by exponents of the "new classical macroeconomics", whose rejection of IS-LM is a by-product of their rejection of Keynesian economics as a whole.

The opposition to IS-LM in certain circles (*e.g.*, the so-called "post-Keynesians") is so vehement as to have led them to denounce it as "bastard Keynesianism". And they justify this epithet by gleefully pointing to the fact that over a decade ago even the father of IS-LM – John Hicks himself – disowned it and announced that "that diagram is now much less popular with me than I think it still is with many other people" (1976, pp. 289-90; see also his 1981 article).

In view of this fact, how can I nevertheless defend IS-LM? My answer has already been given in the remarkable story from the Talmud with which I have prefaced this paper. As the title of this conference indicates, we are gathered here today not only to honor John Hicks, but also to mark the fiftieth birthday of IS-LM. So though Hicks gave us IS-LM, not on Mount Sinai, but only at Oxford, I nevertheless say to him: "You gave us IS-LM fifty years ago; it has since then belonged to all of us". And though we should not go to the extremes of Rabbi Jeremiah and should in fact pay careful attention to the voice of such a distinguished economist as Nobel Laureate John Hicks, his reservations acquire no additional weight or validity from the fact that John Hicks also happens to be the one who gave us IS-LM.

In considering the criticisms of IS-LM, we must distinguish between two distinct, though related, questions:

1) Is it a valid representation of the *General Theory*?
2) Is it a valid and useful analytical construct?

Unfortunately, this distinction has not generally been made by the vehement critics of IS-LM.

The first question is readily answered by the fact that Keynes himself accepted it as valid. In particular, in his letter of 31 March 1937, commenting on a draft of Hicks' 1937 paper, Keynes wrote: "I found it very interesting and really have next to nothing to say by way of criticism" (*Collected Writings*, vol. XIV, p. 79). Now, it is true that Hicks' paper presented a favorable review of the *General Theory*, and it is only natural that an author is not inclined to disagree with a favorable critic. On this, however, I would like to make two related

comments: First, Harrod also wrote a favorable review of the *General Theory*. Indeed here again Keynes also wrote him (in a letter dated 30 August 1936) that he "found it instructive and illuminating, and I really have no criticisms" (*Collected Writings*, vol. XIV, p. 84) – but Keynes immediately went on to make the significant criticism that "you don't mention *effective demand*" (*ibid.*, p. 85, italics in original). There are no such significant criticisms in Keynes' aforementioned letter to Hicks. Second, if Keynes had found the IS-LM interpretation as objectionable as those who have in recent years mounted a virtual *jihad* against it, he could not have uttered even a word of half-praise for it.

I must also emphasize that the one diagram that we do find in the *General Theory* (p. 180) is logically equivalent to the IS curve. For though drawn with different axes, this diagram shows different combinations of the rate of interest and the level of income in which the commodity market is in equilibrium. Furthermore, Keynes goes on to say that this diagram alone cannot determine the equilibrium levels of these variables; but "if, however, we introduce the state of liquidity-preference and the quantity of money and these between them tell us that the rate of interest is r_2, then the whole position becomes determinate" (*ibid.*, p. 181). Here, then, is the spirit of IS-LM – the determination of the equilibrium level of income by the interaction between the markets for commodities and money – even if not its precise geometrical form.

One of the major criticisms of IS-LM as an interpretation of the *General Theory* is that it does not take account of the emphasis in this book on expectations, and correspondingly does not take account of the "animal spirits" (*GT*, p. 161) that influence investment decisions. But we must remember that Keynes concludes his discussion of "animal spirits" with the statement that:

> We should not conclude from this that everything depends on waves of irrational psychology. On the contrary, the state of long-term expectation is often steady, and, even when it is not, the other factors exert their compensating effects. (*GT*, p. 162.)

In a similar way, Keynes writes:

> There are not two separate factors affecting the rate of investment, namely, the schedule of the marginal efficiency of capital and the state of confidence. The state of confidence is relevant because it is one of the major factors determining the former, which is the same thing as the investment demand-schedule. (*GT*, p. 149.)

In brief, even after taking account of "the state of confidence" as determined by expectations, Keynes still speaks of a determinate "investment demand-schedule" – and it is this schedule which, together with the consumption function, is represented by the IS curve.[1]

It is of course true that if there is a significant change in expectations, then the IS curve will also shift, thus generating a new equilibrium position. But this too is in accord with the analysis of the *General Theory*. For this analysis (as I shall emphasize below) is one of short-term Marshallian equilibrium: that is, equilibrium determined under the assumption that certain factors which may well change over time are for the moment considered to be held constant. Indeed, even after expressing his reservations about IS-LM, Hicks himself emphasized that the IS-LM diagram is "concerned with that 'short period' during which the money wage can be taken as given" (1982, p. 100).[2] And I see no reason why a corresponding statement about given expectations should not hold for the "investment demand-schedule".

In this connection I would also like to say that though uncertain expectations clearly play a vital role in the *General Theory*, I do not see how it can be presented as the central message of this book for whose absence the IS-LM diagram should then be faulted. For as Samuelson (1946, p. 320) noted long ago, Keynes' discussion "paves the way for a theory of expectations, but it hardly provides one". Similarly, Hart's (1947) detailed critique points out major deficiencies in Keynes' treatment of this subject. We must also remember that Keynes' notion of uncertainty as not being subject to a probability calculus had already been presented by Knight in his classic 1921 work on *Risk, Uncertainty, and Profit*.[3] Thus, in contrast with the theory of effective demand, Keynes' discussion of uncertain expectations in the *General Theory* made little advance over the then-existing state of the art.

Another criticism that has been made of IS-LM is that, apart from its applicability to inflation generated by excess demand, it cannot be used to analyze changes in the price level, and is particularly unsuited for an analysis of cost inflation. For the sake of

[1] In writing this paragraph, I have benefited from reading an unpublished paper by HARRI HASKO (1986).

[2] I might note that this is precisely the assumption that Keynes makes on p. 27 of the *General Theory*, and which holds until ch. 19 of the book.

[3] There may also be a hint of it in ch. 6 of Keynes' 1921 *Treatise on Probability*, to which Keynes refers in this context (*GT*, p. 148, n. 1).

argument, let me for the moment accept this contention, but then go on to emphasize that it too in no way invalidates IS-LM as an interpretation of the *General Theory*. There is an unfortunate tendency among critics of IS-LM to ignore the historical context in which this book was written: the context of the chronic mass unemployment and deflation that beset the Western world in the 1930s. Correspondingly, the central message of the *General Theory* has to do with employment and output, not with the price level. As Keynes said in chapter 3, the chapter whose purpose it is to give "a brief summary of the theory of employment to be worked out" in the book (*GT*, p. 27):

> Thus the analysis of the propensity to consume, the definition of the marginal efficiency of capital and the theory of the rate of interest are the three main gaps in our existing knowledge which it will be necessary to fill. When this has been accomplished, we shall find that the theory of prices falls into its proper place as a matter which is subsidiary to our general theory. (*GT*, pp. 31-32).

I must also emphasize that when in chapter 21 of the *General Theory* on the "Theory of Prices", Keynes does finally turn to this subsidiary theme, he really does very little of an analytical nature with it. This is particularly true of the elasticity formulas in this chapter as well as in the preceding one on the employment function, whose implications he does very little to draw out.[4]

In any event, Sidney Weintraub's criticism of many years ago (1961, p. 21) that the IS-LM analysis "omits entirely the phenomenon of changing price levels" is certainly not well-taken. For the description of the rightward shift of the LM curve as the price (and/or wage) level declines in the face of unemployment (as is in effect described in ch. 19 of the *General Theory*) is standard fare of macroeconomic textbooks; and the leftward shift as the price level rises is equally familiar (see below). Similarly, some forty years

[4] It may also be relevant to note that there are errors in the elasticity formula on p. 305 of ch. 21 (see NAYLOR 1968 and 1969). Similarly, in a letter he wrote a year after the publication of the *General Theory* in response to criticisms of the formulas in the first section of his ch. 20 on the employment function, Keynes himself admitted:

> I have got bogged [sic] in an attempt to bring my own terms into rather closer conformity with the algebra of others than the case really permits. When I come to revise the book properly, I am not at all sure that the right solution may not lie in leaving out all this sort of stuff altogether, since I am extremely doubtful whether it adds anything at all which is significant to the argument as a whole. (*Collected Writings*, vol. XXIX, p. 246.)

ago, I showed how – if we take account of the real-balance effect – the IS curve would also shift rightwards as the result of a price decline (Patinkin, 1951).

I would also like to say that though the analysis of the determination of the price level is a subsidiary matter in the *General Theory*, the IS-LM diagram has long since been supplemented by another diagram which reflects Keynes' assumptions about the way this level is determined. In particular, as we all recall, though in Chapter 2 of the *General Theory*, Keynes rejects the "second classical postulate" that the "utility of the wage when a given volume of labour is employed is equal to the marginal disutility of that amount of employment", he accepts the "first classical postulate" that "the wage is equal to the marginal product of labour" (*GT*, p. 5). He also accepts the classical law of diminishing returns, which implies that "an increase in employment can only occur to the accompaniment of a decline in the rate of real wages" (*GT*, p. 17). Using these two assumptions we can (for a fixed money wage rate) construct an aggregate supply curve of real national output as a function of the price level, whose intersection with an aggregate demand curve for real output as a function of this level (derived as the locus of intersection points in the IS-LM diagram as the price level varies) then simultaneously determines the equilibrium levels of both price and output (see Dornbusch and Fischer, 1987, ch. 7). Needless to say, these curves are not the same as those which respectively bear these names in chapter 3 and elsewhere of the *General Theory*.

I would like now to return to Hicks' 1981 article and to point out that it too does not say that IS-LM is not a proper interpretation of the *General Theory*. On the contrary, it seems to me that Hicks is very careful not to say this (*cf.*, *e.g.*, part I of his article). Instead, the purpose of his article is to indicate some of the analytical problems which, from a rigorous viewpoint, are inherent in IS-LM – with some of them also indicated as being inherent in the *General Theory* itself (*cf.*, especially part II of the article). Similarly, though I do not question the fine points related to time that Hicks makes in part III of this article, I think that the same points of criticism could be made with respect to other basic analytical apparatuses of economics, including ordinary Marshallian demand and supply curves. Thus on these points I see Hicks less as a critic of IS-LM, than as an advocate of the general need for greater rigor in the analysis of time in economics. And it is no accident that this is a subject to which he has devoted much attention.

Before leaving this part of my paper, I would like to emphasize that though I have always maintained the validity of the IS-LM analysis as an interpretation of the *General Theory*, I have also always rejected two contentions that have frequently been made about it in this connection: namely, the contentions that the validity of the argument of the *General Theory* is crucially dependent on the assumptions of absolute wage rigidity and/or the "liquidity trap". And I have also argued that both of these contentions stem from the mistaken attempt to interpret the *General Theory* as being concerned with a permanent position of "unemployment equilibrium", and not a short-term one whose level of the rate of interest, and consequently unemployment (as Keynes goes on to argue in ch. 19, most significantly entitled "Changes in Money Wages"), is affected (but to little avail) by a decline in the money-wage rate (see Patinkin 1951, sec. 13; 1956 and 1965, chs. XIII:1, XIV:1, and Supplementary Note K:3; 1976, pp. 101-2, 111-14).[5]

Let us turn now to the second question listed above: the usefulness of IS-LM as an analytical construct. The simplest way of answering this question is to give examples of various additional uses that the profession has continued to make of it. Thus I have already indicated how IS-LM has been supplemented to deal with the determination of the price level. Long before that, Lloyd Metzler (1951, p. 104) interpreted a diagram analogous to the IS-LM one in a way that enabled it to be used in dynamic stability analysis (*i.e.*, as what is now in our discipline – following earlier mathematical terminology – called a phase diagram). And in my *Money, Interest and Prices* (1956, p. 154, n. 2, and ch. XIII:4; 1965, p. 232, n. 2 and ch. XIII: 4),

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[5] In a critique entitled "What Was the Matter With IS-LM?" (1983, p. 65), Axel Leijonhufvud has claimed that "IS-LM has served us ill" in leading to the contention "that Keynes was merely doing orthodox economics with rigid wages". From what has just been said, it is clear that this contention is not inherent in the IS-LM analysis. This is also true for some of the other alleged deficiencies for which Leijonhufvud criticizes IS-LM (*e.g.*, the fact that in certain cases both curves shift, and the fact that the dynamic adjustment path is affected by the nature of expectations: see the discussion of such cases below). Accordingly, I feel that Leijonhufvud's article should have more appropriately been entitled "What Was the Matter With *the Way Many Economists Applied* IS-LM?".

Leijonhufvud also criticizes IS-LM for leading to the "wrongful dismissal" of the "loanable funds versus liquidity preference controversy". To the extent that this controversy reflected an assumption that different results would follow from the choice of the market in which to carry out the analysis (*i.e.*, the market for loans as against the market for money – and that was its main thrust), it was rightfully dismissed (see Patinkin 1965, chs. XI:3 and XV:3).

For other criticisms of Leijonhufvud's paper, see Solow (1984).

I explicitly adapted Metzler's diagrammatical analysis to IS-LM. Robert Mundell (1968, ch. 18) extended IS-LM to an open economy and used it to analyze the effects of international capital movements under both fixed and flexible exchange rates. David Laidler (1968) used IS-LM to provide a dynamic analysis of a macroeconomic model whose consumption and money-demand functions are – in accordance with the permanent-income hypothesis – both dependent on lagged values of income. Indeed, the use of IS-LM to analyze the short- and long-run effects of an autonomous increase in expenditures in such a case has been a standard student exercise in many courses in macroeconomics. Again, William Poole (1970) carried out an analysis of the optimal choice of monetary policy under conditions of uncertainty by introducing stochastic elements into the IS-LM model. And Hal Varian (1977) has analyzed the stability of a disequilibrium IS-LM model.

This is not to deny that we frequently have to make restrictive assumptions in order for the IS-LM analysis to yield unambiguous results. Thus if we assume that a real-balance effect exists in the commodity market, any exogenous change which affects the equilibrium price level will affect IS as well as LM, and assumptions will generally (but not always – see below) have to be made about the relative magnitudes of these two effects. But in this, the crossed curves representing IS-LM are no different than that other set of crossed curves that stem from Marshall. (In terms of Leijonhufvud's charming 1973 essay on "Life Among the Econ", the "Totem of the Macro" is in this respect no different from the "Totem of the Micro".) Thus, for example, a technological change can frequently cause a shift of both the Marshallian supply and demand curves of a given commodity, so that assumptions must be made about the relevant magnitudes of these shifts in order to determine the nature of the new equilibrium position (*cf., e.g.,* Hirshleifer, 1984, p. 32).

As an example of the foregoing, let me use IS-LM to analyze the specific case of an increase in investment (*i.e.*, a positive shift of the marginal-efficiency-of-capital schedule) that is at least in part financed by a decrease in liquidity preference. In such a case, both the IS and LM curves shift to the right, so that the equilibrium level of income is definitely increased. On the other hand, it would seem that the new equilibrium level of the rate of interest is indeterminate. But this indeterminacy can be removed by making assumptions about the nature of the excess-demand function for bonds, which market is – by

virtue of Walras' Law – operating behind the scenes of the IS-LM diagram. Thus, if we assume that this function does not depend on the level of income and that the increase in investment is financed entirely by the decrease in liquidity preference, then (under the assumption of a constant price level) the equilibrium rate of interest will remain unchanged. On the other hand, if the increased investment is in part financed by a positive shift in the supply function of bonds, then the rate of interest will rise.[6]

Let me devote the rest of this paper to showing how IS-LM can be generalized to deal with inflationary problems which are quite distant from the *General Theory*, though Keynes did deal with those generated by excess demand in his *How to Pay for the War* (1940): namely, inflation in a full-employment economy.

I begin with the standard analysis of a once-and-for-all increase of k percent in the quantity of money taking place in an economy whose individuals act in accordance with the assumption of adaptive expectations, and which is in equilibrium at the full-employment level of real income Y_F (Figure 1).[7] This causes initial shifts of both the IS (because of the real-balance effect) and the LM curves to the right. The resulting intersection point Q′ represents a situation of excess demand in the commodity market, thus causing prices to rise. As prices rise, real balances decrease, so that both the IS and LM curves shift to the left. This excess demand and consequent upward movement of prices will continue until they too have increased by k percent, thus reducing real balances to their original value, and

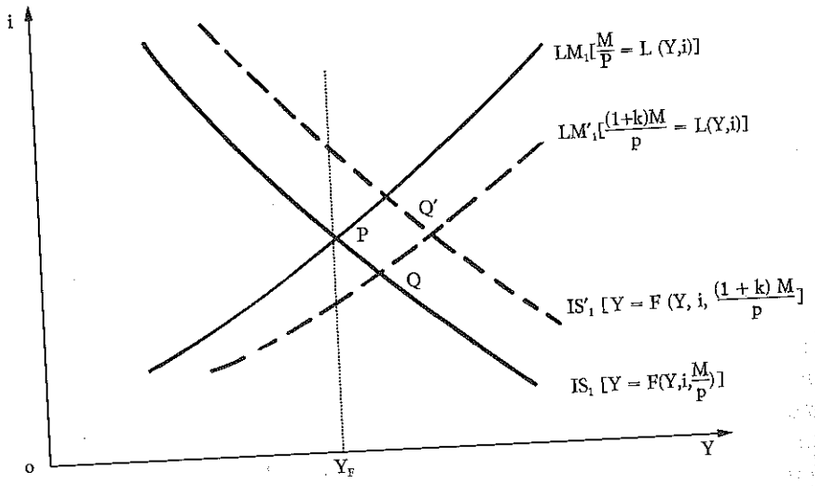
[6] On the validity of Walras' Law in the case of Keynesian unemployment (which has sometimes been denied: *cf.* CLOWER 1965), see PATINKIN (1987 and 1989, pp. xx-xxi).

I have in this paragraph followed the procedure advocated in my *Money, Interest, and Prices* (1965, chs. X-XV) of carrying out the analysis explicitly in all three markets: commodities, bonds, and money. Thus the case just discussed in the text can be analyzed by means of figure XIII-3 in that book (p. 332). In particular, if the increased investment is financed entirely by the shift in liquidity preference, then the horizontal PP curve in that diagram (representing the bond market) remains unchanged, so that the rightward shifts of the GG and MM curves (corresponding respectively to IS and LM) will (by Walras' Law) be such as to intersect at an unchanged rate of interest. On the other hand, if it is financed in part by an increased supply of bonds, then the PP curve shifts upwards, so that GG and MM must intersect at a higher rate of interest.

[7] This paragraph presents within an IS-LM framework an analysis similar to that presented in my *Money, Interest, and Prices* (1965, ch. X:3) within an alternative framework. The analysis there deals more explicitly with the dynamic adjustment process. It also assumes that the increase in the quantity of money originates in the deficit-financing of a one-time increase in government expenditures. This assumption – which affects the dynamics of the system but not its comparative statics – could also have been dealt with within the IS-LM framework.

hence both IS and LM to their respective original positions and hence original intersection point at P. (Under the assumption of rational expectations, the price level would immediately increase by k percent, so that the curves would not shift at all.) Thus the increase in the quantity of money has simply caused a proportionate increase in the absolute price level, while leaving unchanged the equilibrium levels of both interest and real income. In brief, money – in accordance with the traditional quantity theory – is neutral.

FIGURE 1



I would now like to point out that the respective roles of M and p in the foregoing model can be reversed, thus enabling it to deal with problems of cost inflation. In particular, consider an economy with a policy of maintaining continuous full-employment by means of an accommodating monetary policy. Assume now that as the result of a supply shock (*e.g.*, an increase in the price of oil), p is exogenously increased. This causes IS and LM to shift to the left, thus generating unemployment. In accordance with the foregoing policy, the government then increases M in the same proportion as p, thus restoring IS and LM to their respective original positions and hence intersection at full employment.

The same analysis can be applied, *mutatis mutandis*, to an exogenous increase in the money wage, w, which initially – *i.e.*, with p unchanged – increases the real wage and thus generates unemployment. The accommodating monetary policy will then once again increase M in the same proportion as w has increased; this will also cause p to increase in the same proportion, thus restoring the original real wage and hence full employment.

Let me now return to the assumption that the quantity of money is exogenous and assume that an initial steady-state of an economy with a constant quantity of money and price level (represented by the intersection of IS_1 and LM_1 at point P in Figure 2) is disturbed by an increase in this quantity which is not of the once-and-for-all variety, but a continuous one proceeding at a constant instantaneous rate of change of π percent, with output remaining constant at the full-employment level Y_F. As before, I shall assume that the individuals in this economy act in accordance with the assumption of adaptive expectations; for simplicity, I shall however now disregard the real-balance effect in the commodity market. Let us now examine the nature of the new steady-state in which, by definition, both the quantity of money and the price level are rising at a continuous and fully-anticipated instantaneous rate of π percent. This generates a difference between the nominal (i) and the real (r) rates of interest described by the familiar Fisherine relationship

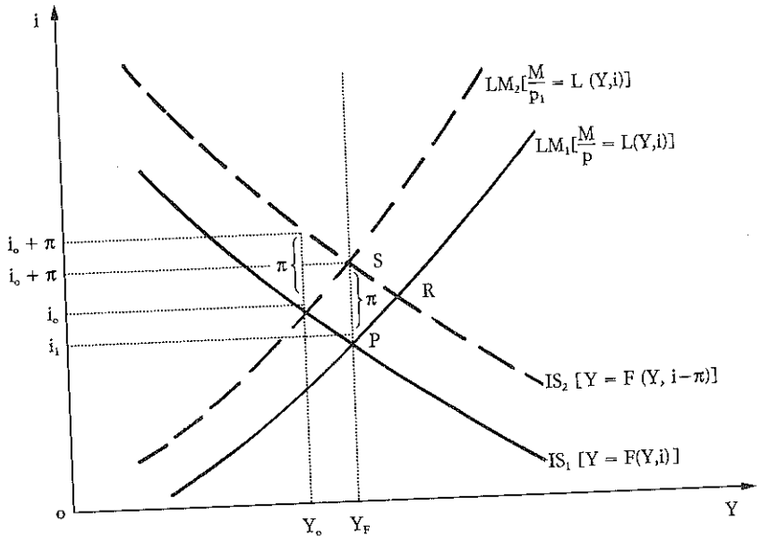
$$r = i - \pi,$$

where all rates are instantaneous ones.

Following Mundell (1963, 1965), we first introduce the crucial distinction that the consumption and investment decisions represented by the IS curve are affected by the real rate of interest, $i-\pi$, whereas the money-demand decision is affected by the nominal rate, i. The reason for this last statement is that it is the nominal rate which continues to measure the alternative cost of holding money instead of an interest-yielding bond. The same conclusion is reached from a consideration of real rates of return: this return on bonds is $i-\pi$, while that on money is $-\pi$, so that the alternative cost is again $(i-\pi) - (-\pi = i)$.[8] It follows that

[8] At first sight, it seems counterintuitive that this cost is the nominal, and not real, rate of interest. In part, this feeling stems from a somewhat misleading terminology: for unlike "nominal income", the "nominal" or "money" rate of interest does not have the dimensions of money; indeed, it has the same dimensions as the real rate of interest – namely, 1/time. On the other hand, the total cost of holding the money balances is a real one – namely $i \cdot (M/p)$ – which clearly has the dimensions of commodities/time.

FIGURE 2



if in the steady-state M and p are both rising at π percent per year, then M/p and hence LM will initially remain unchanged at LM_1 in Figure 2. On the other hand, the IS curve will initially shift upward by π percent. For if with stable prices the commodity market was in equilibrium at (say) the level of real income Y_0 and interest i_0, it will (at Y_0) continue to be in equilibrium at the same *real* rate of interest, which now corresponds to the *nominal* rate $i_0+\pi$. Thus the IS curve of the inflationary steady-state shifts upward and parallel to IS_1.

What must now be emphasized is that since (by assumption) the economy's output remains Y_F, the intersection of IS_2 with LM_1 at point R cannot be a steady-state situation; for at this point a situation of excess demand in the commodity market exists. Hence the price level will begin to rise faster than the steady-state rate π, thus causing real balances M/p to decline and hence the LM curve to shift leftwards. And this process will continue until it reaches LM_2: *i.e.*, until it once again intersects the IS curve at the full-employment level Y_F (point S). At this new steady-state equilibrium, the price level will resume its rise at the rate of π percent per year; but it will do so at a higher level than it would have been at if it had always risen at this

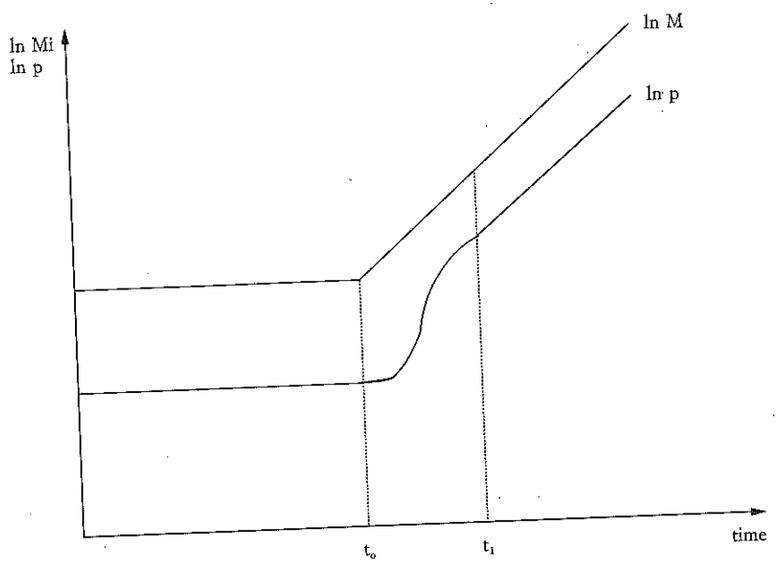
rate. Accordingly, real balances (which henceforth again remain constant) will be lower at S than at R, reflecting the effect of the higher nominal rate of interest $i_1+\pi$ on the amount of real balances demanded. On the other hand, the real rate of interest will once again be what it was in the initial steady-state. Thus with respect to the equilibrium real rate, money is not only neutral, but "superneutral". As might, however, be expected, the equilibrium real quantity of money is less. (Needless to say, in the real world of imperfectly anticipated rates of inflation, the movement from steady-state R to S will not be as smooth as all that; indeed, Fisherine miscalculations of the true real rate of interest might generate cycles (see Fisher, 1913, pp. 58-60, 67-72). On the other hand, under the assumption of rational expectations, the movement to point S will be immediate).

The dynamic adjustment path of the price level implicit in Figure 2 is described in Figure 3, which shows the results of replacing (at time t_0) a full-employment regime with a stable quantity of money and hence prices by one with an expanding quantity of money. As implied by Figure 1, this causes the price level to increase initially (*i.e.*, before individuals – who, by assumption, are acting in accordance with adaptive-expectations – have fully adjusted their expectations to the new inflationary situation) at a rate lower than that of the quantity of money, thus causing the real quantity of money (represented by the vertical difference between the two curves) to increase. At some subsequent stage, however, the price level must rise faster than does the nominal quantity of money, in order to reduce the real quantity (at time t_1) to a new steady-state level below that which prevailed at t_0. In this new steady-state, M and p once again grow at the same rate, so that real balances remain constant. Thus at any point of time after t_1, the price level will have risen (relative to the situation at any point of time before t_0) more than proportionately to the quantity of money. Needless to say, this analysis can readily be extended to one in which the initial steady-state is also one of inflation, though at a different rate than the one which begins at time t_0.[9]

Two further comments: First, note that the steady-state position at S in Figure 2 is one of rising prices even though there is no excess demand in the commodity market. This follows from the stability-condition consideration that if prices were not to rise while the monetary expansion continued, the resulting increase in real balances would cause the

[9] On this paragraph, see FRIEDMAN (1969), pp. 8 ff; *cf.* also PATINKIN (1972), pp. 202-204.

FIGURE 3



LM curve to shift rightwards, thus generating inflationary pressures which would ultimately cause prices to rise. [10] (Alternatively, this steady-state equilibrium could be explained by the assumption of rational expectations). Second, as I have shown elsewhere (Patinkin, 1972, ch. 10), this analysis can be generalized to deal with a growing economy with a real-balance effect – in which case, however, the equilibrium real rate of interest would be decreased, so that money would not be superneutral.

Lest the purpose of this paper be misunderstood, let me conclude by expressing my full agreement with Robert Solow's observation (1984, p. 25) that "it would be terribly subversive of macroeconomic theory if a two-equation model could sum up most of what we need to know". My purpose has been instead to refute what I consider to be unwarranted criticisms of IS-LM, and to demonstrate by examples its continued analytical usefulness as it enters its second half-century.

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[10] FRIEDMAN (1969), p. 10. Note that initially in this counterfactual case (*i.e.*, when $\pi = 0$), the IS curve would not shift upwards.

BIBLIOGRAPHY

CLOWER, R. (1965), "The Keynesian Counterrevolution: A Theoretical Appraisal". In F.H. Hahn and F.P.R. Brechling, eds., *The Theory of Interest Rates*. London: Macmillan, pp. 103-25.

DORNBUSCH, R. and FISCHER, S. (1987), *Macroeconomics*, 4th ed. New York: McGraw Hill.

FISHER, I. (1913), *The Purchasing Power of Money*. Revised ed. New York: Macmillan.

FRIEDMAN, M. (1969), "The Optimum Quantity of Money". In *The Optimum Quantity of Money and Other Essays*. Chicago: Aldine, pp. 1-50

HART, A.G. (1947), "Keynes' Analysis of Expectations and Uncertainty". In S.E. Harris, ed., *The New Economics: Keynes' Influence on Theory and Economic Policy*. New York: Knopf, pp. 415-24.

HASKO, H. (1986), "Keynes' Theory of Investment: The Separation of Management and Ownership and the Instability of Finance". *Discussion Paper* 49, Labour Institute for Economic Research, Helsinki.

HICKS, J.R. (1937), "Mr. Keynes and the 'Classics': A Suggested Interpretation". *Econometrica* 5 (April): pp. 147-59. As reprinted in HICKS (1982), Ch. 8.

HICKS, J.R. (1976), "Time in Economics". In A.M. Tang *et al.*, eds., *Evolution, Welfare and Time in Economics: Essays in Honor of Nicholas Georgescu-Roegen*. As reprinted in HICKS (1982), Ch. 21.

HICKS, J.R. (1981), "IS-LM - an Explanation". *Journal of Post Keynesian Economics* 3 (Winter): pp. 139-54. As reprinted in HICKS (1982), Ch. 23.

HICKS, J.R. (1982), *Money, Interest, and Wages: Collected Essays on Economic Theory: Vol. II*. Oxford: Basil Blackwell.

HIRSHLEIFER, J. (1984), *Price Theory and Applications*. 3rd ed. Englewood Cliffs, NJ: Prentice Hall.

KEYNES, J.M. (1936), *The General Theory of Employment, Interest and Money*. London: Macmillan.

KEYNES, J.M. (1940), *How to Pay for the War*. As reprinted in Vol. IX of KEYNES, *Collected Writings*, pp. 367-439, London: Macmillan for the Royal Economic Society, 1972.

KEYNES, J.M. (1973), *The General Theory and After: part II, Defence and Development*. Edited by Donald Moggridge. Vol. XIV of KEYNES, *Collected Writings*. London: Macmillan for the Royal Economic Society.

KNIGHT, F.H. (1921), *Risk, Uncertainty and Profit*. New York: Houghton Mifflin.

LAIDLER, D. (1968), "The Permanent-Income Concept in a Macroeconomic Model". *Oxford Economic Papers* 20 (Mar.): pp. 11-23.

LEIJONHUFVUD, A. (1973), "Life Among the Econ". *Western Economic Journal* 11 (Sept.): pp. 327-37.

LEIJONHUFVUD, A. (1983), "What Was the Matter With IS-LM?". In J.P. Fitoussi, ed., *Modern Macroeconomic Theory*. Oxford: Basil Blackwell, pp. 64-89.

METZLER, L.A. (1951), "Wealth, Saving, and the Rate of Interest". *Journal of Political Economy* 59 (Apr.): pp. 93-116.

MUNDELL, R. (1963), "Inflation and Real Interest". *Journal of Political Economy* 71 (June): pp. 280-83.

MUNDELL, R. (1965), "A Fallacy in the Interpretation of Macroeconomic Equilibrium". *Journal of Political Economy* 73 (Feb): pp. 61-6.

MUNDELL, R. (1968), *International Economics*. New York: Macmillan.

NAYLOR, THOMAS H. (1968), "A Note on Keynesian Mathematics". *Economic Journal* 78 (March): pp. 172-73.

NAYLOR, THOMAS H. (1969), "A Third Note on Keynesian Mathematics". *Economic Journal* 79 (March): pp. 183-84.

PATINKIN, D. (1951), "Price Flexibility and Full Employment". In F.A. Lutz and L.W. Mints, eds., *Readings in Monetary Theory*. Philadelphia: Blakiston, for the *American Economic Association*, pp. 252-83. (Revised version of a 1948 article).

PATINKIN, D. (1956), *Money, Interest, and Prices*. Evanston, Il.: Row Peterson.

PATINKIN, D. (1965), *Money, Interest, and Prices*. 2nd ed. New York: Harper & Row.

PATINKIN, D. (1972), "Money and Growth in a Keynesian Full-Employment Model". In *Studies in Monetary Economics*. New York: Harper & Row, pp. 195-204.

PATINKIN, D. (1976), *Keynes' Monetary Thought: A Study of Its Development*, Durham, NC: Duke University Press.

PATINKIN, D. (1987), "Walras's Law". In J. Eatwell, M. Milgate, and P. Newman, eds., *The New Palgrave: A Dictionary of Economics*. London, Macmillan, vol. 3, pp. 639-44.

PATINKIN, D. (1989), *Money, Interest, and Prices*, 2nd ed. abridged, with a new introduction. Cambridge, Mass.: MIT Press.

POOLE, W. (1970), "Optimal Choice of Monetary Policy Instruments in a Simple Stochastic Macro Model". *Quarterly Journal of Economics* 84 (May): pp. 197-216.

SAMUELSON, P.A. (1946), "Lord Keynes and the General Theory". *Econometrica* 14 (July): 187-200. As reprinted in R. Lekachman, ed., *Keynes' General Theory: Reports of Three Decades*. New York: St. Martin's Press, 1964, pp. 315-31.

SOLOW, R.M. (1984), "Mr. Hicks and the Classics". *Oxford Economic Papers* 36 (Nov., supplement): pp. 13-25.

VARIAN, H.R. (1977), "The Stability of a Disequilibrium IS-LM Model". *Scandinavian Journal of Economics* 79 (no. 2): pp. 260-70.

WEINTRAUB, S. (1961), *Classical Keynesianism, Monetary Theory, and the Price Level*. Philadelphia: Chilton.